AMENDMENTS TO THE CLAIMS

1-25. (Cancelled)

26. (Currently Amended) A method for providing a dynamically spectrally tailored Raman pump, said Raman pump generating Raman gain for a plurality of signal wavelengths, said method comprising the steps of:

~~providing a plurality of gain elements, said plurality of gain elements generating said Raman pump that comprises a plurality of spectral components~~;

driving ~~said~~ a plurality of gain elements utilizing a plurality of current sources, each current source of said plurality of current sources driving at least one gain element of said plurality of gain elements by a variable current, wherein each of said plurality of gain elements generates a spectrally distinct output;

combining outputs from said plurality of gain elements to generate said Raman pump that comprises a plurality of spectral components;

providing said Raman pump to an optical medium to generate Raman gain for said plurality of signal wavelengths;

determining power levels associated with said plurality of signal wavelengths; and

adjusting variable currents of said plurality of current sources utilizing in part said power levels associated with said plurality of signal wavelengths wherein said adjusting causes dynamic spectral tailoring of said Raman pump.

27. (Previously Presented) The method of claim 26 wherein said step of providing a plurality of gain elements includes providing an external cavity, comprising a plurality of optical components, that provides feedback to said plurality of gain elements and to combine output beams from said plurality of gain elements to form said Raman pump.

28. (Previously Presented) The method of claim 27 wherein said external cavity comprises:

a collimating optical assembly that collimates beams from said plurality of gain elements;

a dispersive element that spectrally separates beams after collimation by said collimating optical assembly; and

a partial reflector providing feedback after spectral separation by said dispersive element.

29. (Previously Presented) The method of claim 28 wherein said partial reflector is embedded in an optical fiber, wherein said external cavity further comprises:

a focusing lens focusing an output beam into said optical fiber.

30. (Previously Presented) The method of claim 29 wherein said dispersive element is selected from the list consisting of:

reflective diffraction grating;

transmission diffraction grating;

prism; and

hologram.

31. (Original) The method of claim 28 further comprising the step of:

adjusting divergence of each output beam from said plurality of gain elements.

32. (Original) The method of claim 31 wherein said step of adjusting divergence is performed by an array of micro-lenses.

33. (Original) The method of claim 26 further comprising:

initiating respective current changes to selected ones of said plurality of gain elements; and

measuring resulting changes in power levels associated with said plurality of signal wavelengths for each respective current change to selected ones of said plurality of gain elements.

34. (Original) The method of claim 33 further comprising:

building a differential gain matrix, wherein said differential gain matrix relates a change in power levels associated with said plurality of signal wavelengths to a change in power associated with plurality of gain elements.

35. (Original) The method of claim 33 further comprising the step of:

inverting said differential gain matrix to produce an inverted matrix.

36. (Original) The method of claim 35 further comprising the step of:

multiplying said inverted matrix by a desired power level change vector.

37. (Currently Amended) The method of claim 26 further comprising the step of:

storing patterns of current levels to ~~implement~~ support a computational learning algorithm, said computational learning algorithm repetitively refining control coefficients in response to said stored patterns of current levels, wherein said adjusting is performed using said control coefficients from said computational learning algorithm.

38. (Original) The method of claim 26 further comprising:

applying a number of current combinations to said plurality of current sources to determine optimal current levels.

39. (Currently Amended) A system for providing Raman gain to a plurality of signal wavelengths, comprising:

a plurality of gain elements producing output beams;

a collimating optic focusing said output beams on a dispersive element;

said dispersive element combining said output beams as a Raman pump that comprises a plurality of spectral components;

a Raman amplifier receiving said Raman pump for amplifying said plurality of signal wavelengths; and

a controller device causing said plurality of gain elements to operate at variable power levels in response to received information indicative of Raman gain produced by said Raman pump on said plurality of signal wavelengths, wherein operation of said plurality of gain elements at variable power levels cause dynamic spectral tailoring of said Raman pump.

40. (Previously Presented) The system of claim 39 further comprising:

an array of micro-lenses adjusting divergence of said output beams from said plurality of gain elements.

41. (Previously Presented) The system of claim 39 further comprising:

an optical fiber;

a partial reflector reflecting a portion of said Raman pump as feedback for said plurality of gain elements, wherein said partial reflector is embedded in said optical fiber; and

a fiber coupling lens for coupling said Raman pump into said optical fiber.

42. (Previously Presented) The system of claim 39 further comprising:

a spectrum analyzer determining power levels associated with said plurality of signal wavelengths and providing said information indicative of Raman gain to said controller device.

43. (Previously Presented) The system of claim 39 further comprising:

a linear detector array;

a focusing lens focusing beams of the plurality of signal wavelengths being amplified diffracted from said dispersive element onto said linear detector array to provide said information indicative of Raman gain to said controller device.

44. (Previously Presented) The system of claim 39 further comprising:

a partial reflector, said partial reflector partially reflecting said output beams toward said dispersive element as reflected beams;

said dispersive element producing zero order diffracted beams from said reflected beams;

a focusing element focusing said zero order diffracted beams onto a detector; and

said detector providing information indicative of an amount of optical power coupled into said optical fiber to said controller device.

45. (Original) The system of claim 39 wherein said controller device includes means for varying said Raman pump to maintain substantially spectrally flat Raman gain.

46. (Original) The system of claim 45 wherein said means for varying said Raman pump includes means for building a differential gain matrix, wherein said differential gain matrix relates changes in power levels associated with said plurality of gain elements to changes in optical power at said plurality of signal wavelengths.

47. (Original) The system of claim 45 wherein said means for varying said Raman pump includes means for multiplying said differential gain matrix by desired signal wavelength power changes.

48. (Previously Presented) The system of claim 45 wherein said means for varying said Raman pump includes means for storing patterns of currents applied to said plurality of gain elements, said patterns of currents applied to said plurality of gain elements being generated by a computational learning algorithm.

49. (Original) The system of claim 45 wherein said means for varying said Raman pump includes means for applying a plurality of current combinations to said plurality of gain elements.